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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/13/2003

Gee-Sung Chae

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EXAMINER

NGUYEN, LAUREN

ART UNIT

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2871

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/705,914	Applicant(s) CHAE ET AL.	
	Examiner LAUREN NGUYEN	Art Unit 2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13, 14 and 17-21 is/are pending in the application.
- 4a) Of the above claim(s) 1-8 and 17-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-11, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 04/13/2010 has been entered.

Response to Amendment

2. Applicant's arguments filed on 04/13/2010 have been fully considered but they are not persuasive.

3. The applicant argues (see pages 8-9) that in Maeda et al., the second layer (1b) including nitrogen is not disposed between the first layer (1a) and the substrate, and the second layer (6b) including nitrogen is not disposed between the first layer (6a) and the ohmic contact layer. This is irrelevant and is not persuasive. **Maeda et al.** (figure 6) discloses a manufacturing method of an array substrate as claimed in **claim 9** including the first copper compound layer (1a) is disposed between the first copper layer (1b) and the substrate to increase adhesion between the first copper layer and the substrate, and the second copper compound layer (6a) is disposed between the second copper layer (6b) and the ohmic contact layer (5) to prevent a chemical reaction between the second copper layer and the silicon component of the ohmic contact layer. The examiner merely relies on **Ishikura et al.** for the teachings of the first and second copper compound layers (11) including nitrogen (see at least column 8, lines 10-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify

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the copper compound layers as taught by **Ishikura et al.** in order to prevent oxidation at the surfaces of the metal layers. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the method as taught by **Ishikura et al.** since it was known in the art that such methods are common method to form the copper compound layers.

4. The claim language therefore does not patentably distinguish over the applied reference[s], and the previous rejections are maintained.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 9-11 and 13-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Maeda et al. (US 2001/0029054)** in view of **Kim et al. (US 6,091,466)** and **Sai et al. (JP 2000-165002)**; further in view of **Ishikura et al. (US 6,219,125)**.

7. Regarding **claim 9, Maeda et al.** (figure 6) discloses a manufacturing method of an array substrate for a liquid crystal display device, comprising:

- forming a first copper compound layer (1a; see at least paragraphs 0046 and 0080) directly on a substrate;
- forming a first copper layer (1b) directly on the first copper compound layer;

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- forming a gate line and a gate electrode by etching the first copper compound layer and the first copper layer (see at least paragraph 0053), wherein a top surface of the first copper layer has a narrower width than a top surface of the first copper compound layer;
- forming a gate insulating layer (3) on the gate line and the gate electrode;
- forming an active layer (4) on the gate insulating layer over the gate electrode;
- forming an ohmic contact layer (5) on the active layer;
- forming a second copper compound layer (6a; see at least paragraph 0081) directly on the ohmic contact layer;
- forming a second copper layer (6b) on the second copper compound layer directly on the ohmic contact layer;
- forming a data line, a source electrode, a drain electrode (6, 7) by etching the second copper compound layer and the second copper layer on the ohmic contact layer, wherein the data line crosses the gate line, the source and drain electrodes over the gate electrode;
- forming a passivation layer (10) on the data line, the source electrode, the drain electrode and the island-shaped metal layer, the passivation layer having a first contact hole exposing the drain electrode;
- forming a pixel electrode (11) on the passivation layer, the pixel electrode connected to the drain electrode through the first contact hole and connected to the island-shaped metal layer through the second contact hole,
- wherein the first copper compound layer (1a) is disposed between the first copper layer (1b) and the substrate to increase adhesion between the first copper layer and the substrate, and the second copper compound layer (6a) is disposed between the second

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copper layer (6b) and the ohmic contact layer (5) to prevent a chemical reaction between the second copper layer and the silicon component of the ohmic contact layer.

Please note that the claims are directed to apparatus which must be distinguished over the prior art in term of structure rather than functions [MPEP 2114]. Hence, the functional limitations of "*the first copper compound layer helps to increase adhesion between the first copper layer and the substrate, and the second copper compound layer helps to prevent a chemical reaction between the second copper layer and the silicon component of the ohmic contact layer*" which are narrative in form have not been given any patentable weight. In order to be given patentable weight, a functional recitation must be supported by recitation in the claim of sufficient structure to warrant the presence of the functional language. See *In re Danley*, 120 USPQ 528, 531 (CCPA 1959).

8. **Maeda et al.** is silent regarding forming the first and second copper compound layers including nitrogen; the island-shaped metal layer; and the thickness of the copper layer and copper compound layer.

9. **Ishikura et al.** teaches the first and second copper compound layers (11) including nitrogen (see at least column 8, lines 10-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the copper compound layers as taught by **Ishikura et al.** in order to prevent oxidation at the surfaces of the metal layers. In addition, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the method as taught by **Ishikura et al.** since it was known in the art that such methods are common method to form the copper compound layers.

10. **Kim et al.** (in at least column 2, lines 50-55, figures 4-6B) teaches an island-shaped metal layer (151) is simultaneously formed with the source and drain electrodes; the island-shaped metal layer is disposed over the gate line (113); the passivation layer (137) having a second contact hole (181) exposing the island-shaped metal layer; and the pixel electrode (141) connected to the island-shaped metal layer through the second contact hole. Therefore, it would

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have been obvious to one of ordinary skill in the art at the time of the invention to combine the storage capacitor electrode as taught by **Maeda et al.** in order to increase the storage capacitance of the unit pixel and simplify the manufacturing process. Therefore, **Maeda et al. as modified by Kim et al.** teaches an island-shaped metal layer by etching the second copper compound layer and the second copper layer on the ohmic contact layer.

11. In addition, **Sai et al.** (drawing 7) teaches the first copper layer (2000 a; see at least paragraph 0047) is thicker than the first copper compound layer (50-500 Å; see at least paragraph 0009). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the thickness of the copper and copper compound layers in order to improve the acid resistance over moisture, and decrease the manufacturing costs.

12. Regarding **claim 10**, **Maeda et al.** as modified by **Kim et al.** and **Sai et al.** discloses the limitations as shown in the rejection of **claim 9** above. However, **Maeda et al.** as modified by **Kim et al.** and **Sai et al.** is silent regarding forming the limitations of **claims 10-11 and 13-14**. **Ishikura et al.** teaches the first and second copper compound layers (11) are formed in a processing chamber where a gas flows that chemically combines with the copper; the gas is N.sub.2 (see at least column 8, lines 10-15); the first and second copper layers (12) are formed in a processing chamber where a gas flows that does not chemically combine with the copper; the gas is Ar (see at least column 8, lines 16-20). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the copper and copper compound layers as taught by **Ishikura et al.** in order to prevent oxidation at the surfaces of the metal layers. In addition, it would have been obvious to one having ordinary skill in the art at the time

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the invention was made to use the method as taught by **Ishikura et al.** since it was known in the art that such methods are common method to form the copper and copper compound layers.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lauren Nguyen whose telephone number is (571) 270-1428. The examiner can normally be reached on M-Th, 7:30-6:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lauren Nguyen/
Examiner, Art Unit 2871